N-63-7-3

TM-1245/000/00A

TECHNICAL MEMORANDUM

(TM Series)

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"Indian Ocean Station" Buffer (IOSB)

Milestone 4

by

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12 June 1963

Approved

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Modified Pages	Notes and Filing Instructions
19	ERRATA* Delete section 2.2.1.5.3
19	ERRATA* Change section 2.2.1.5.4 to 2.2.1.4.3
20	ERRATA* Change section 2.2.1.5.5 to 2.2.1.4.4
21-24	Remove pages 21-24 dated 20 May 1963 Insert pages 21-24D dated 11 June 1963
25	ERRATA* Delete partial paragraph on top of page, up to section 2.2.2
27	ERRATA* Section 2.2.3 - Delete last sentence
29	Remove page 29 dated 20 May 1963 Insert page 29 dated 12 June 1963
30	Remove page 30 dated 20 May 1963 Insert page 30 dated 12 June 1963
32	ERRATA* Section 2.2.4.8 - Change **9 to **11
35	ERRATA* Section 3.2.2.2 - Add the following sentence at the end of the paragraph: "SPREPX will suppress all messages for the T & C computer except Antenna Pointing (#25).
36	ERRATA* Section 3.2.3.2 - Change the fifth sentence to read as follows: "On the first pass, it will have SPUN punch out new antenna pointing messages for the T & C computer, and on the second pass all new messages for the TLM computer.

*ERRATAS are pen and ink changes

Modified Pages	Notes and Filing Instructions
36	ERRATA* Section 3.2.3.2 - Change the next to last sentence to read as follows: "The last message punched for each group of messages will be a "Prepass Transmission Finished" message.
38	ERRATA* Section 3.3.3.7 - Change **9 to **11
40	Remove page 40 dated 20 May 1963 Insert page 40 dated 12 June 1963
40A, 40B, 40C	Add pages 40A, 40B, 40C
41 & 42	Remove pages 41 and 42 dated 20 May 1963 Insert pages 41 and 42 dated 12 June 1963
B-1	ERRATA* Section 2.1.2-Change title to read "Real Time Near Message".

* ERRATAS are pen and ink changes

Word 6	VVVV	
7	RRRR	
8	RRRR	
9	TT	System time to begin operation in binary.
10	TTTT	
11	GGGG	Duration of operation in seconds. (Will be zero for vehicle site can see but not scheduled to look at.)
12	GGGG	
.		
.		Words 5-12 may be repeated six more times.
.		
n	CKSM	

A single schedule message covering a single time span may be sent to the station to update, override, or supplement a previous schedule.

2.2.1.4.5 Telemetry Mode Messages

2.2.1.4.5.1 Pre-Flight Telemetry Mode Specification (FM/FM)

Word 1	7777	
2	SS27	
3	27NN	
4	AAVV	A's = Telemetry type (1 = FM/FM).
5	VVVV	
6	MMMM	M's = Mode number in octal.
7	PPPP	P's = Patchboard ID; three 4-bit BCD characters.
8	FFFF	F's = Number of frames per second in octal.
9	WWWW	W's = Number of words per frame.
10	QQQQ	Q's = Number of frames per master frame in octal.
11	IIII	Bit 11 = 1 process this identification. = 0 do not process this identification. 10-9 type of point: 02, fixed format. 03, events. 8-0 Identification number.**

** Super commutated points are indicated by identical Identification Numbers in sequential entries.

12 LLLL L's = location in octal of first word in core relative to the frame.

13 DDDD D's = the number which must be added to the L's to obtain the second word address.

14 CCCC C's = the compression algorithm number.

15 XXXX X's are parameters required by the algorithm.

16 XXXX If C is 1, Algorithm #1 ("Step Function") is indicated and Word 15, bits 11-9, decommutator number.
7-0, noise limit.
16, absolute value of step threshold, in octal, greater than noise level.
17, if bit 11 = 1, tenth second accuracy required; otherwise zero.
18, zero

If C is 2, Algorithm #2 ("Steady State Function") is indicated and
Word 15, bits 11-9, decommutator number.
7-0, noise limit
16, high limit in octal.
17, low limit in octal.
18, number of seconds in report period as a power of 2.

If C is 3, Algorithm #3 ("Smoothing Function") is indicated and
Word 15, bits 11-9, decommutator number.
7-0, high limit
16, low limit.
17, number of seconds in report period as a power of 2.
18, zero.

If C is 4, Algorithm #4 ("Switch Setting - Unequal Increments") is indicated and
Word 15, bits 11-9, decommutator number.
7-0, 1st non-zero level (highest).
16, 2nd non-zero level.
17, 3rd non-zero level.
18, 4th non-zero level (lowest).

If C is 5, Algorithm #5 ("Switch Setting - Equal increments") is indicated and
Word 15, bits 11-9, decommutator number.
7-0, high limit in octal.
16, low limit in octal.
17, number of increments between high and low limits (1-10).
18, zero

If C is 6, Algorithm #6 ("Meter") is indicated and
Word 15, bits 11-9, decommutator number.
7-0, high level.
16, low level
17, number of repeated bits in meter readout message.

Words 11-18 may be repeated up to five times.

Word 19		
	⋮	
	⋮	
n	CKSM	

The first mode specification message will be as it appears above. All succeeding mode specification messages within a mode will not have Words 7-10.

2.2.1.4.5.2 Prepass Telemetry Mode Selection and Modification Message (FM/FM).

Word 1	7777	
2	SS30	
3	30NN	
4	AAVV	A's = telemetry type; 1 = FM/FM.
5	VVVV	
6	RRRR	
7	RRRR	
8	MMMM	
9	PPPP	P's = patchboard number.
10		If there are no changes to be made to the basic mode information, Word 10 will be a checksum. If there are changes, the eight words of the preflight message (Words 11-18) will be sent for each change.
⋮		
⋮		
n		

This message will always be sent prepass to tell the tracking station what mode is desired by the STA.

2.2.1.4.5.3 Real Time Telemetry Mode Selection and Modification Message (FM/FM).

Word 1	7777	
2	SS32	
3	32NN	
4	MMMM	
5		If no change to basic mode information, Word 5 is checksum. If there are changes, the eight words of the preflight message (type #27), Words 11-18 will be sent for each change.
⋮		
⋮		
n+1	CKSM	

2.2.1.4.5.4 PRE-FLIGHT TELEMETRY MODE SPECIFICATION MESSAGE (PCM).

Word 1	7777	
2	SS27	
3	27NN	
4	AAVV	A = telemetry type (3 = PCM)
5	VVVV	

Word 6	MMMM	Mode number
7		Not used
8	FFFF	Number of bits/second
9	WWWW	Number of bits/frame
10	QQQQ	Number frames/master frame
11-63		Vary according to message contents defined below
64	CKSM	

Five types of information are contained in the body of message No. 27:

a. Mode Structure Information
b. Print Headings
c. Processing table (TLMP1 to TLMP8)
d. Algorithm Calling Sequences
e. Table Look Up Data for Printing

The Mode Structure items are contained in the first message No. 27 for the mode and consist of the following 33 items:

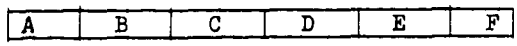
Item #	Item Tag	Description
1	PAYADD	First bit address of payload sync.
2	STAADD	First bit address of status sync.
3	PAYLNG	Number of bits in payload sync.
4	STALNG	Number of bits in status sync.
5	PAYSYN	Payload sync pattern (11 bits/word, left justified to 2^{10})
6	STASYN	Status sync pattern (11 bits/word, left justified to 2^{10})
7	PAYERR	Number of errors allowed for payload sync search.
8	STAERR	Number of errors allowed for status sync search.
9	DTCALL	Nominal value of DTU calibration low value.
10	DTCALH	Nominal value of DTU calibration high value.
11	SCCALL	Nominal value of signal conditioner calibration low value.
12	SCCALH	Nominal value of signal conditioner calibration high value.
13	CSPCAL	Nominal value of command status point calibration.
14	DTCLLT	Tolerance for DTU calibration low value.
15	DTCLHT	Tolerance for DTU calibration high value.
16	SCCLLT	Tolerance for signal conditioner low value.
17	SCCLHT	Tolerance for signal conditioner high value.
18	CSPCLT	Tolerance for command status calibration point.
19	DTADDL	First bit address of DTU calibration low.
20	DTADDH	First bit address of DTU calibration high.
21	SCADDL	First bit address of signal conditioner low.

Item #	Item Tag	Description
22	SCADDH	First bit address of signal conditioner calibration high.
23	CSPADD	First bit address of command status point calibration.
24	DTFRML	Frame number of DTU calibration low.
25	DTFRMH	Frame number of DTU calibration high.
26	SCFRML	Framd number of signal conditioner low.
27	SCFRMH	Frame number of signal conditioner high.
28	CSPFRM	Frame number of command status point calibration.
29	FRMADD	First bit address of status frame word.
30	NOWRDS	Number of words of fixed format.
31	NIDNTS	Number of fixed format idents.
32	REPPER	Reporting period (power of 2)
33	CSPEND	Address of Algout CSP Block ending.

The Print Headings are in messages 2-4 and consist of 2-120 column-packed BCD print images.

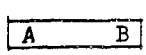
The Processing Tables (TLMP0-8) are in messages 5-38 and consist of blocks of 200 entries corresponding to telemetry points to be processed. The description of TLMP0-8 follows.

TLMP0



2^{11}	A = Process Bit	A = 1 Process Point.
$2^{10} - 2^{9}$	B = Type of Point	B = 0 Fixed Format = 1 Event = 2 CSP
2^{8}	C = Dummy Point	C = 1 Do Not Process
$2^{7} - 2^{5}$	D = Calibration Info.	D = 0 No Normalization = 1 DTU = 2 SC = 4 CSP
2^{4}	E = Subcommutation Information	E = 0 Subcommutated = 1 Not Subcommutated
$2^{3} - 2^{0}$	F = Frame Number if Commutated	

TLMP1



$2^{11} - 2^{8}$	A = Spare
$2^{7} - 2^{0}$	B = First Bit Address of Point

TLMP2 | A | B |

$2^{11} - 2^{6}$ A = Number of bits

$2^{5} - 2^{0}$ B = Algorithm number

TLMP3 | A |

$2^{11} - 2^{0}$ A = Relative address in ALGIN, algorithm input storage.

TLMP4 | A |

$2^{11} - 2^{0}$ A = Relative address in ALGOUT, algorithm output storage.

TLMP5 | A |

$2^{11} - 2^{0}$ A = Characters one and two of ident if event.
= Starting column if fixed format.

TLMP6 | A |

$2^{11} - 2^{0}$ A = Characters three and four of ident, if event.
= Number of columns if fixed format.

TLMP7 | A |

$2^{11} - 2^{0}$ A = Characters five and six of ident, if event.
= Number of bits, if fixed format

TLMP8 | A |

$2^{11} - 2^{0}$ A = Relative address in print where table look up information is stored

ALGIN Algorithm Input Storage

The algorithm calling sequences are packed in messages 39-44 and contain the sequences described by the Algorithms.

PRINT Table Look Up Information

The Table Look Up Data are the BCD information contained in the Bird Buffer table, CNVRT, and are in messages 45 and on.

2.2.1.4.5.5 **PREPASS TELEMETRY MODE SELECTION MESSAGE (PCM)**

Word 1	7777	
2	SS30	
3	30NN	
4	AAVV	A = Telemetry Type (3 = PCM)
5	VVVV	
6	RRRR	
7	RRRR	
8	MMMM	
9	0000	Option number 0 = Full frame or command summary 1 = Suppressed frame or engineering status
10	CKSM	Checksum if no mode structure change
or	IIII	Mode structure item number
11		
12		Not used
13		
14	XXXX	
15	XXXX	Parameters as required
16	XXXX	
17	XXXX	
18	CKSM	

This format allows the Bird Buffer program to use the same card format and message for FM/FM and PCM. Because of print format-related problems, real time calling sequence modifications are not possible.

2.2.1.4.5.6 **REAL TIME TELEMETRY MODE SELECTION MESSAGE (PCM)**

Word 1	7777	
2	SS32	
3	3214	
4	MMMM	
5	IIII	Mode structure item number
6	0000	Option number
7		Not used
8		
9	XXXX	
10	XXXX	Parameters as required
11	XXXX	
12	XXXX	
13	CKSM	

This format also allows complete Bird Buffer compatability.

2.2.1.5.6 Latitude Crossing Message.

Word 1	7777	
2	SS31	
3	31NN	
4	VV	
5	VVVV	
6	RRRR	
7	RRRR	
8	D PP	D = bit 11. Bit 11 = 1 if crossing is North to South, bit 11 = 0 is crossing is South to North. PP is the number of grids used in this pass to determine crossing. PP ≤ 10.
9	GGGG	Words 9 and 10 form a couplet. There are PP such couplets in a message. GGGG is a grid number ≤ 4094. If G's are the number of a warning grid, then bit 0 = 1 in Word 10 or C = 1. If G's are the number of a crossing grid, then bit 1 = 1 of Word 10 or C = 2. If G's are the number of a reporting grid only, then C will be zero. Bits 2-11 of Word 10 are not used.
10	C	
NN+1	CKSM	

This message will be sent to the site as part of the prepass data for a particular revolution. The latitude crossing report going from the remote station to the STC will be sent as a status message.

2.2.4.1 Initialize.

Cols.	1- 4	**00	Identifies the card as an INITIALIZE card.
	5- 6	Blank	Always blank.
	7-10	VVVV	Contains the vehicle number, in decimal.
	11-12	Blank	Always blank.
	13-20	MM/DD/YY	Contains the present month, day, and year; all decimal, and separated by slashes.
	21-22	Blank	Always blank.
	23-24	AM or PM	Usually indicates whether it is morning or afternoon when the INITIALIZE card is entered (see 2.1.6).
	25-26	Blank	Always blank.
	27-28	PT or Blank	Indicates whether a new Prepass Tape should be made up for this vehicle. If blank, a Prepass Tape exists. If PT, a new Prepass Tape should be made up (new vehicles only).
	29-30	Blank	Always blank.
	31-32	SS	Site number.
	33-80	Ignore.	

2.2.4.2 Transfer Prepass.

Cols.	1- 4	**02	Identifies the card as a Transfer Prepass card.
	5- 6	Blank	Always blank.
	7-10	VVVV	Vehicle number, in decimal.
	11-12	Blank	Always blank.

	Cols 13-16	RRRR or Blank	May contain a revolution number or may be blank. If blank, all prepass data for the specified vehicle will be transferred. If a revolution number is specified, only prepass data for that revolution will be transferred.
	17-18	Blank	Always blank.
	19-20	SS or Blank	May be blank or may contain a site number. If blank, all prepass data for the specified vehicle will be transferred. If Cols. 19-20 contain a site number, only prepass data for that site will be transferred.
	21-80		These columns are ignored by the program and may be used for further card identification if desired.

2.2.4.3 Merge Tape

Cols. 1-4	**04	Identifies the card as a Merge Tape card.
5-6	Blank	Always blank

2.2.4.4 Send Prepass

Cols. 1-4	**06	Punch all prepass data on a Bird Buffer 163 tape, which has not yet been sent.
5-6	Blank	
7	T/Blank	Blank = Punch paper tape "T" = Write on Magnetic Tape No. 4.
9-10	Blank	
11	R/blank	R is Rerun (send old prepass, 1 Rev only)
12, 13	Blank	
14, 15	RRRR	Used only if col 11 = R
16-80		Unused

2.2.4.5 Transfer Card Prepass

Cols. 1-4	**07	Indicates that card prepass data is to be merged on the Prepass Tape.
5-6	Blank	Always blank
7-10	VVVV	Vehicle number, in decimal.

either a visual header or a prepass message. SPUN will then extract the data, format the header or message and punch the tape.

After each header or prepass message is output, SPUN will return control to SPREPX.

3.4.3 Tape Contents. Each paper tape will contain prepass messages for the TLM and for the T & C computers. Each set of messages designated for one computer will be preceded by a visual header.

The information on the header will include the station number, the destination computer (T & C or TLM), vehicle number, revolution number, and the time of initial antenna pointing data (month/day/year/seconds).

The visual header will be followed by a Prepass Coming message. Each group of messages (grouped by message code) including the Prepass Coming message will be preceded by a visual representation of the two digit message code. A 77_8 will be punched following the 15 blank frames associated with the last Prepass Ending message for the T & C computer.

Blank frames will be used to separate individual messages and groups of messages as follows:

1. 15 frames - to precede and follow each visual tape header, and to follow each Prepass Ending message.

2. 5 frames - to separate individual messages.

A graphic representation of the tape format is presented in Appendix C.

3.4.4 Method. Upon entry by SPREPX, if a visual header is requested, data will be extracted by SPUN from communication cells, formatted into visual representations and punched on 5-level paper tape. After the header is punched, the Prepass Coming message will be extracted, formatted into 5-bit words (4 data bits + odd parity) and output; control will then be returned to SPREPX.

If a visual header is not requested, SPUN will extract a message from a data buffer, determine message length, and format each 12-bit word into three 5-bit words (4 data bits & odd parity). The message will then be punched and control returned to SPREPX.

An option will be provided to write the paper tape image on magnetic tape.

3.4.5 Interfaces. Communication cells used by SPUN must be preset with vehicle number, revolution number, and time of initial antenna pointing data.

The data buffer set by SPREP should contain a valid message upon each entry to SPUN.

3.5 Telemetry Processing Module

3.5.1 Name: STEPP - Telemetry Process and Print

3.5.2 Description:

The functions of the Telemetry Module are to accept telemetry data from the remote station, perform any legal conversions which are requested, and prepare a selected set of data for printout on the Data Analysis Printer and another set for printout on the Data Presentation Printer. The Telemetry Module will also prepare for printout any alarms or status messages generated by the telemetry computer at the remote station.

Processing of incoming messages will be handled in the following manner: The event portion of a telemetry report will be placed in an event buffer by the Executive Module (SXCON); the fixed format portion of a message will not be buffered but will be replaced by new fixed format each second. When the Telemetry Module is entered, it will check to see if there is a status or alarm message to be printed. If there is and it is less than twenty-three characters in length, it will be placed in the printer image beginning in the first column reserved for events; if it is twenty-three characters or more, it will replace the fixed format printout. After the status or alarm message is formatted or if there are no status and alarm messages, the Telemetry Module will begin processing the events. The first event will be placed in the column specified for events unless, (1) the event buffer has reached saturation, in which case events will replace fixed format or (2) there are more events than can be printed in one second, in which case events will replace the tracking data printout for that second. Events will be taken out of the event buffer sequentially and prepared for printout until all columns available on one of the printers have been used. Associated system time will be printed out at the beginning of each second and each time a new system time is reported by the remote station. The contents of an event printout will include a six character identification, the value, two characters of units and time in tenths of seconds or out-of-limits indication if reported by the compression algorithm. The value may be printed in octal, decimal, percent of band width, engineering units, switch setting with two settings or a level for multilevel functions.

Fixed format information will be processed in the order that it appears in the message. A particular item of information may appear on either or both the Data Analysis or Data Presentation printer in different columns but must be printed in the same manner: octal, decimal, percent of band width, engineering units, or switch settings. The Telemetry Module will make the required conversion and print the number of characters which have been allowed for the point.

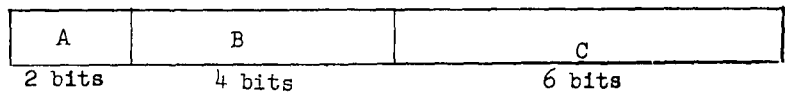
For both fixed format and events the module will print an "N" for the value of the point whenever the tracking station sends a report of noise for that item.

3.5.3 Interfaces

Tables are required by the Telemetry Module containing information about the format of the telemetry report and information about how the Bird Buffer is to print the data. These tables may be supplied by a 1604 program. The detailed format of the tables is given below:

3.5.3.1 The TMPNT table has 6 blocks of N words. (N is the number of telemetry points to be processed in this mode.) The first register in TMPNT contains information about the point associated with identification number 1, the second register about point 2, etc. The information contained in the register is dependent upon whether the point being processed is fixed format or event.

TMPNT 0

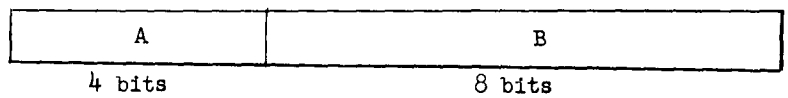


A Indicates on which printers the data is to be printed; A = 10 for D/A; A = 01 for D/P.

B Indicates how data is to be printed; B = 001 for octal; B = 010 dec.%; B = 011 table lookup; B = 100 engineering units; B = 101 decimal; B = 110 BCD

C Is the number of compression algorithm used.

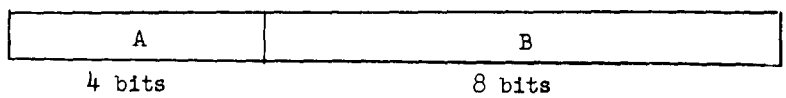
TMPNT 1
(fixed format)



A Is a spare.

B Is the first column on the D/A printer for this point.

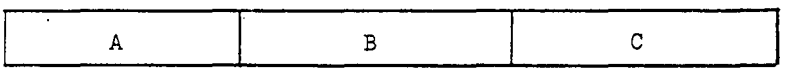
TMPNT 2
(fixed format)



A Is the number of columns allowed for this point.

B Is the first column on the D/P printer for this point.

TMPNT 3 (fixed format)



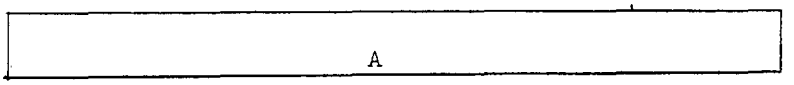
A Is the location of the first bit in the Telemetry Report (0-11).

B Is a spare.

C Is the number of bits.

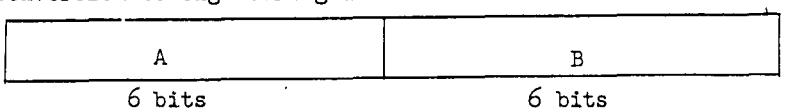
For events, TMPNT 1, 2, and 3 are six characters of associated header to be printed with each event.

TMPNT 4



A Is the address of the information in CNVRT needed to perform the conversion to engineering units.

TMPNT 5



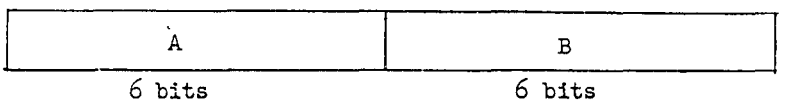
A, for ax + b conversions, equals the number of fractional characters in the answer which are to be printed after shifting and converting.
B, for ax + b conversions, equals the number of shifts of the 22-bit product of "a" times "x" necessary to correspond to the value of b.

A, for table look-up conversions, contains an indicator in Bit 11 which is set to a one if each entry in the conversion table contains 6 four bit BCD digits. Bit 11 set to zero indicates that each module in the conversion table is expressed in 3 four bit BCD characters.
B, for table look-up conversions, indicates the number of right shifts to be made on the reported telemetry data prior to table look-up.

A, for octal conversions, as unused.
B, for octal conversions, indicates the number of right shifts to be performed on the reported telemetry data prior to conversion.

A and B of TMPNTS are not used for this type conversions.

TMPNT 6



A Is the first legal Printer character for an event units label.

B Is the second legal Printer character in the units label for events.

3.5.3.3 The CNVRT table contains the conversion factors necessary to perform conversions to engineering units. It will contain the constants A and B necessary to perform linear conversions Ax + B and tables of four-bit BCD characters required to do nonlinear conversions.

3.5.3.4 Special Handling of Particular Algorithms.

a. For algorithm #20 (Max., Min., Avg.), the conversions specified in the table TMPNT will be applied three times identically to the three input values.

b. For algorithm #21 (Do Nothing) a new line of telemetry will be started at the beginning of the next second.

c. Algorithms #22-31 will be handled compatibly with FM/FM algorithms #1-11.

3.5.4 Restrictions.

3.5.4.1 Telemetry items will be printed in percent of full-scale or engineering units with errors due to conversion accuracy not exceeding one percent.

3.5.4.2 A maximum of six characters of header will be printed with each event.

3.5.4.3 The number of conversions which can be done will be limited by the length of the CNVRT table and processing time.

3.5.5 Existing Subroutines Used. None.

3.6 VERIFY PAPER TAPE MODULE

3.6.1 Name: SPIN - Prepass Paper Tape Verifier

3.6.2 Description. The functions of the Verify Paper Tape Module are to read the prepass paper tape, check the parity of each frame of data, check that individual messages checksum to zero, and compare commanding messages with their redundant messages.

SPIN will be entered by the executive module upon the input of a VERIFY PAPER TAPE request card. SPIN will return to the executive upon completion of its functions, or upon recognizing an error on the paper tape.

The processing of the paper tape will be done in the following manner: SPIN will select the paper tape reader and search for the first message on the tape. The tape will then be read frame at a time, and the parity of each frame will be checked. When three frames have been read, they will be assembled into a 160A word and the word will be assigned to a message buffer. When the end of a message is signaled by a blank frame, the message in the buffer will be checksummed. This processing continues until a second occurrence of 15 stop codes (35_8).

3.6.3 Restrictions

1. The prepass paper tape must be in the reader.
2. The reader must be ready.
3. The reader must be set to read 5-level tape.

3.6.4 Use of Existing Subroutines. None

3.6.5 Flow Charts. See Appendix A, Page A-27.

3.7 BIRD BUFFER/1604 COMMUNICATION MODULE

3.7.1 Name: Bird Buffer 1604/Communication Link - SIBBTC

3.7.2 Description: SIBBTC provides the IOSB 160A computer programs communication with a 1604 computer by means of a 1615 tape logic unit operating in the Satellite Mode. These operations will be performed by SIBBTC: Communicate with the 1604 via control messages, receive prepass messages for a specific vehicle from the 1604, and receive SCHOPS data from the 1604. All transfers will be core-to-core, using the direct transfer mode of the 1615. The three types of transfers are detailed below.

3.7.2.1 Prepass messages from the 1604 for a vehicle will consist of antenna pointing, commands, latitude crossing, and text information. SIBBTC will examine each block of the prepass message to determine whether that block is a command. Commands will be retransmitted to the 1604 for a bit-by-bit comparison with what was sent to the 160A. All other classes of prepass messages will be checksummed to determine correctness of transmission. Prepass information may be requested by two classes: for one pass (one vehicle), or all data for all revs (for one vehicle).

3.7.2.2 SCHOPS data will be sent by the 1604 to the Bird Buffer. The Bird Buffer will respond as to correctness of the data.

3.7.3 Interfaces. This section will be devoted to a discussion of program control, processing, and input, output parameters.

3.7.3.1 Program Control. The sequence of SIBBTC program operation commences when SIBBTC has been referenced by a return jump in the user program. SIBBTC will interrogate cell 0070 in bank 2 to determine its operation. Other direct cells specify vehicle number (V), revolution number (R), and station number (S).

Cell 0070	0 = resume contact
	1 = not used
	2 = not used
	3 = transfer SCHOPS
	4 = transfer prepass

If contact is to be initiated, SIBBTC will determine whether or not the 1604 has enabled interrupt. COPII sets Flag 1 when it cannot be interrupted; in this situation, SIBBTC notifies the operator and waits for the 1604 to clear Flag 1. When it finds Flag 1 cleared, an interrupt 1604 command will be executed. If, after 55 seconds, the 1604 does not respond to the interrupt by giving write control to the 160A, SIBBTC will exit back to the user program with an error flag set. (If the switch to the 1615 is open at the time of the interrupt attempt, a phantom resume will be generated and SIBBTC will exit to the user program with the same error flag set.) If contact is to be resumed, SIBBTC will assume that contact has been previously established, and it will enable receipt

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